

REMARKS

Claims 1 and 5-7 are the elected claims being prosecuted in this case. These claims have been reviewed and edited where necessary for clarity and readability. For example, in claim 1, the placement of the shutter rows has been moved from the first to the second paragraph, and this placement now follows the positive recitation of the transparent substrates. By so doing, there is a clear antecedent for the subsequent use of this latter term. Also, the European phrase “characterized in that” has been replaced by the conventional term “wherein.” An additional structure, i.e., a seal, has been added and this seal is found adjacent the outer periphery of the two transparent substrates. Thus, the seal differs from the positioning wall that is defined in the last paragraph of claim 1.

Claims 1 and 5-7 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the U.S. Patent to Natsunaga No. 5,548,423 in view of the U.S. Patents to Masaki No. 4,636,817 and Ohta et al. (“Ohta”) No. 4,614,954. This rejection is respectfully traversed.

In the present invention, a partitioning wall is provided in at least one position between a plurality of shutter rows in a liquid crystal shutter to overcome the problem of light-flux interference between adjacent shutter rows. While it may be possible to increase the distance between the plurality of shutter rows of a liquid crystal shutter to prevent the occurrence of light-flux interference, this causes another problem in that the upper and lower substrates of the liquid crystal shutter are increased in size. These substrates can become warped by this increase in size, and the shutter characteristics can thereby become deteriorated. The present invention avoids this interference of light fluxes without concern of substrate warpage or shutter deterioration.

Natsunaga (correctly Matsunaga, who is also an inventor of the present invention) does disclose a plurality of shutter rows, but Natsunaga fails to disclose the problem of the occurrence of interference of light fluxes when the plurality of shutter rows are irradiated with light at the same time. Accordingly, Natsunaga fails to disclose the solution to this problem which solution avoids having to increase the size of the substrates of the liquid crystal shutter. The present invention is an improvement of the invention disclosed by Natsunaga.

The patent to Masaki discloses two rows or three rows of shutter apertures arranged in a mutually staggered fashion to form a shutter array element. Masaki also discloses that the distance between adjacent shutter apertures in each row is set to be 1.22-2.0 (two rows) or 2.4-3.4 (three rows) times the length of one shutter aperture in the direction of extension of each row of shutter apertures. A shutter array element having two rows or three rows of shutter apertures arranged in a mutually staggered fashion, as disclosed in Masaki, appears to be only one shutter row that is comprised of either two or three rows of apertures. Thus, Masaki does not disclose a plurality of shutter rows as claimed in the claims nor the claimed partitioning wall that defines the interval between two transparent substrates and between the plurality of shutter rows, e.g., two shutter rows. Masaki, it is submitted, does not correct the shortcomings of Natsunaga.

The patent to Ohta also fails to teach or make obvious the present claimed invention. Ohta discloses a liquid crystal light panel having a gap between the two glass plates 39 and 40 which gap is maintained by a spacer 45. The liquid crystal light panel disclosed in Ohta has only one shutter row, and the problem that confronted the

present inventors does not appear to exist. Thus, the spacer 45 disclosed in Ohta is not a partitioning wall that is formed in at least one position between a plurality of shutter rows, as set forth in claim 1. The spacer 45 in Fig. 10 of Ohta is instead used to maintain a gap between the glass plates 39 and 40, as explained in col. 7, beginning at line 14. At best, this would relate only to the seal of present claim 1 that is adjacent the outer periphery of the transparent substrates and not to the separate, partitioning wall discussed above and which also is claimed in claim 1.

The Examiner also appears to use Masaki as the basis to find obviousness of the mathematical relationship of claims 5-7. However, as discussed above, Masaki appears only to define one shutter row that is comprised of either two or three rows of shutter apertures. The figures "1.22-2.0 (two rows) or 2.4-3.4 (three rows)" discussed in Masaki's mathematics only define the arrangement of apertures in one shutter row. They do not define the relationship of a plurality of shutter rows. Masaki fails to disclose either a plurality of shutter rows or the specific mathematics claimed in claims 5-7 which recite a plurality of shutter rows to obtain pitch Q (claim 5), and values of pitch Q based on the width of a partitioning wall and the width of fringe (claims 6 and 7). Claims 5-7 are accordingly not only unobvious and patentable based on their dependence from claim 1, directly or ultimately, but also for their recitations of patentable features.

Early reexamination and allowance of claims 1 and 5-7 are earnestly solicited.

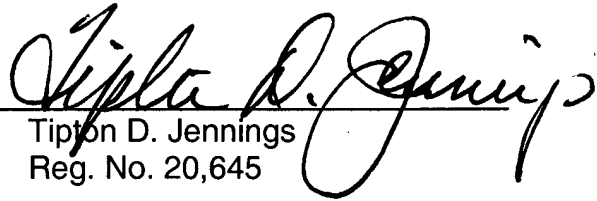
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Respectfully submitted,

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